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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/665,808	09/19/2003	Hao Xu	A033	6637

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VMWARE, INC.
DARRYL SMITH
3401 Hillview Ave.
PALO ALTO, CA 94304

EXAMINER	
RECEK, JASON D	

ART UNIT	PAPER NUMBER
2442	

NOTIFICATION DATE	DELIVERY MODE
09/03/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

ipadmin@vmware.com

Office Action Summary	Application No.	Applicant(s)	
	10/665,808	XU ET AL.	
	Examiner	Art Unit	
	JASON RECEK	2442	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 May 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-11,13,14,30 and 49-70* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11,13,14,30 and 49-70* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

This is in response to the amendment filed on May 29th 2009.

Response to Arguments

1. Applicant's arguments, see pg. 11-14, with respect to the specification objection have been fully considered and are persuasive. Specifically, the argument that the term "computer program embodied in a tangible, computer-readable medium" as recited by claim 51 can be ascertained by one of ordinary skill in the art is persuasive in light of applicant's statement that this term means a computer program stored on a media such as a disk or memory (pg. 14). The objection of the specification has been withdrawn.

2. Applicant's arguments, see pg. 14-17, with respect to the rejection(s) of claim(s) 1-10, 68 and 70 under 103(a) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Vepa et al. US 6,567,377 B1.

3. Applicant's arguments regarding claims 67 and 69 (pg. 17-18) have been fully considered but they are not persuasive. Applicant argues that Ishizaki discards packets received and therefore does not teach discarding outgoing data frames. This argument is not persuasive. Ishizaki clearly discloses discarding a packet if there is no match and

transferring if there is a match (col. 8 ln. 42-53). It is a reasonable interpretation that a packet about to be transferred it is an “outgoing data packet”. Ishizaki discloses deciding whether or not to transfer a packet (i.e. outgoing data packet) by looking at a routing table and discarding the packet if a decision is made not to transfer. Thus Ishizaki teaches “discarding the outgoing data frame if a decision is made not to transfer the outgoing data frame” as recited by the claims.

4. Applicant's arguments with respect to claims 11 and 13 (pg. 18-20) have been considered but are moot in view of the new ground(s) of rejection. These arguments merely repeat the arguments above for the dependent claims, thus they are persuasive for similar reasons but moot in view of the new rejection

5. Applicant's arguments with respect to claims 30 and 64 (pg. 19-20) have been fully considered but they are not persuasive. It is agreed that Macchiano does not explicitly disclose two physical NICs however Mahalingam discloses physical NICs (Fig. 1), the rejection has been amended to reflect this. The argument that Macchiano does not disclose transferring based on priority is irrelevant since Vega was cited as disclosing priority. Applicant also states that no disclosure of "determining which VM ... is involved in the requested data transfer; and if the first VM is involved ... transferring the data over the first NIC" could be found. However, the cited portion (col. 3 ln. 60-65) clearly discloses receiving data from an application (virtual machine user portion, see

col. 3 ln. 49-52), determining which application is involved (based on the table) and forwarding the data to the respective NIC (driver programmed to pass datagram to NIC).

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-10, 68, 70 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mahalingam et al. US Pat. No. 6,208,616 B1 in view of Vega US Pat. No. 7,136,800 B1 and Vepa et al. US 6,567,377 B1.

Regarding claim 1, Mahalingam discloses "obtaining access by a NIC manager to the outgoing data frame" (Fig. 9-10), "receiving, in the NIC manager, NIC management information" (col. 3 ln. 3-10), and "based on the NIC management information [...] selecting a NIC from the plurality of NICs and transferring" as a system that can perform load sharing of packets across a plurality of NICs by using NIC loads as a factor and switching between NICs if one fails (see abstract, paragraph 98, and Fig. 10).

Mahalingam does not teach receiving or using VM-specific information in the decision making process. However Vega teaches making a decision "based on [...] the VM-specific information" by allocating resources among multiple virtual machines running on a physical computer. Vega explicitly teaches using VM-specific information

(col. 3 ln. 65—col. 4 ln. 7) to manage the host computer's resources. Although Vega is directed to allocating processor time, one skilled in the art understands that a NIC is a simply a computer resource and that similar allocation methods can be used.

Vepa teaches a load balancing scheme for selecting physical NICs that takes into consideration the source of the data (col. 3 ln. 40 – col. 4 ln. 17), applied to this case the source represents the virtual machine. Given these teachings, one of ordinary skill in the art would understand that it may be advantageous to use NIC and sender information (VM specific information) to select a physical network interface for the purpose of load balancing. The combination is merely the combination of known elements according to their established function in order to yield a predictable result.

Regarding claim 2, the additional limitation, "in which the VM-specific information indicates an amount of network bandwidth that is allocated to a VM that requested the data transfer" is suggested by Vega as apportioning a percentage of resources to each virtual machine (see paragraph 9, lines 17-18), or in the alternative an absolute capacity (see paragraph 11, lines 1-2). The motivation to combine the two references was set out in the rejection of claim 1.

Regarding claim 3 the additional limitation, "decision is made not to transfer the data because transferring the data would cause the VM's allocation of network bandwidth to be exceeded" is suggested by Vega. Vega teaches that if a VM were to exceed its allocation of resources, the operation would not be allowed (see paragraph

17, lines 11-15). Motivation to combine is the same rationale as used in claim 1 rejection.

Regarding claim 4 the limitation, "in which the VM-specific information indicates the priority of the VM that requested the data transfer relative to the priorities of other virtual machines" is taught by Vega (see paragraph 11, lines 12-15) where priorities are assigned to VMs for the purpose of resource allocation. The motivation to combine these references follows the same rationale as used in claim 1 rejection.

Regarding claim 5 the limitation, "in which the NIC management information indicates which one or more of the plurality of NICs is available for the transfer of data" is disclosed by Mahalingam. The system in Mahalingam controls which NIC to use, to do this it is inherent that a list of available NICs is kept (see Fig. 2, steps 52-66). Motivation to combine is the same as that used in the claim 1 rejection.

Regarding claim 6, Mahalingam discloses the additional limitation "in which the NIC management information further indicates a pending data transfer load for each of the available NICs" as a system that chooses which NICs to use based on an algorithm that includes load information (see column 15, lines 30-35). Motivation to combine is the same as that used in the claim 1 rejection.

Regarding claim 7, Mahalingam discloses "in which a load distribution function, based on the NIC management information [...] is used in selecting a NIC over which to transfer the data" as a system that chooses a NIC based on an algorithm that will choose a NIC that is less loaded than another NIC (see column 15, lines 30-35). The motivation to combine Mahalingam and Vega is the same as stated in the claim 1 rejection.

Regarding claim 8, Mahalingam discloses "the ... data transfer requests are routed over the second NIC if the first NIC is not available" as a system having a primary and secondary NIC where traffic is directed to the primary NIC until it fails and thereafter traffic is directed to the remaining NIC (col. 5 ln. 40-52), and "the ... data transfer requests are routed over the first NIC if the second NIC is not available" as analyzing all NICs for failure and routing data accordingly (col. 5 ln. 58-62, Fig. 2).

Mahalingam does not explicitly disclose "a first VM's data transfer" however as discussed in claim 1, Vega teaches allocating resources among virtual machines (col. 3 ln. 35-40).

Although Mahalingam and Vega do not explicitly disclose, "in which a first VM's data transfer requests are substantially always routed over a first NIC as long as the first NIC is available, and a second VM's data transfer requests are substantially always routed over a second NIC as long as the second NIC is available" this concept is well known in the art (see response to arguments) and yields predictable results. It would have been obvious to one of ordinary skill in the art at the time of the invention to

associate a virtual machine with a NIC and use that NIC to transfer data to and from that virtual machine.

Regarding claim 9, Mahalingam and Vega do not disclose "in which the first VM's data transfer requests are distinguished from the second VM's data transfer requests by reference to a source physical address contained in a header of each data transfer request", however Vepa teaches this as a system that balances loads over multiple network interfaces (abstract). Vepa describes a system where an application can send and receive data specific to it (Fig. 3, col. 3), thus the data transfer request inherently must include an address to receive a response (source port, col. 3 ln. 60-65), this address allows one to distinguish between different data originators (VMs). It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine Vepa because a return address to distinguish the sender is a necessity for any type of two-way communication.

Regarding claim 10, Mahalingam discloses "in which the management information indicates whether a failover is occurring on one of the NICs" as a system that detects NIC failures and determines which NIC to use based on this information (see column 4, lines 30-40). The motivation to combine Mahalingam and Vega is stated above.

Regarding claim 68, Mahalingam discloses a "NIC manager" that has access to data besides the VM data as managing a NIC that is connected to a protocol stack, thus all data will be sent through it (col. 2 ln. ln. 45-52).

Regarding claim 70 it corresponds to claim 68 and thus is rejected for similar reasons.

3. Claims 67 and 69 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mahalingam, Vega and Vepa as applied to claims 1 and 51 above, and further in view of Ishizaki et al. US 6,810,421 B1.

Regarding claim 67, Mahalingam, Vega and Vepa do not explicitly disclose "discarding the outgoing data frame" however this is taught by Ishizaki as discarding an outgoing packet (col. 8 ln. 42-50). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Mahalingam with the discard feature taught by Ishizaki. Ishizaki suggests that discarding packets can reduce administration overhead (col. 2 ln. 5-63).

Regarding claim 69, it corresponds to claim 67 and thus is rejected for similar reasons.

4. Claims 11, and 13-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mahalingam in view of Vega and Vepa and further in view of Rietschote et al. U.S. Pat. No. 7,203,944 B1.

Regarding claim 11, Mahalingam and Vega do not disclose, "in which the VM that has requested the data transfer is temporarily suspended if a failover is occurring on one of the NICs". However Rietschote does teach suspending a virtual machine to balance load (see col. 1 lines 8-10 and col. 7 lines 4-5). The motivation to combine is load balancing which is apparent from the title of the invention. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to suspend the VM when a NIC was failing, this is simply a way of load balancing.

Regarding claim 13, Rietschote discloses "if a decision is made not to transfer the data, a further decision is made whether to suspend the VM that requested the data transfer" as a system that suspends VMs to balance the load. In the present invention it is assumed that when a decision is made not to transfer this is because the VM is exceeding its share of resources, thus an act of load balancing needs to occur. Rietschote teaches suspending the VM as a way of load balancing (see paragraph 24).

Regarding claim 14, Rietschote discloses, "a further decision is made whether to migrate the VM that requested the data transfer to another computer system" as a system for performing load balancing by migrating VMs from one computer system to

another (see paragraph 21). The motivation for combining Rietschote is similar to the motivation set out in the claim 11 rejection.

5. Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Macchiano U.S. Pat. 7,111,303 B2 in view of Vega U.S. 7,136,800 B1 and in further view of Mahalingam et al. U.S. Pat. 6,208,616 B1.

Regarding claim 30, Macchiano discloses, "a method for responding to requests to transfer data from a virtual computer system and to a physical computer network" as a way for users on a virtual machine to communicate using Internet Protocol (see column 3, lines 50-52). Macchiano further discloses, "the virtual computer system comprising a first VM and a second VM" as a virtual machine operating system having a first and second user portion (see column 3, lines 53-54, Fig. 1 components 12, 14; col. 4 lines 50-54). Macchiano also discloses, "the virtual computer system also comprising a first … network interface card (NIC) and a second … NIC for connecting to the computer network" as describing each user portion having a virtual NIC and the computer system may also contain multiple physical NICs (see col. 3 lines 56-58 and Fig. 1 comp. 42, 44; col. 5 lines 4-6).

Macchiano further discloses, "for each data transfer request: determining which VM within the virtual computer system is involved in the requested data transfer; and if the first VM is involved in the requested data transfer, transferring the data over the first NIC" as a way of communication in which a base portion maintains a table of IP

addresses by which the device driver addresses its respective NIC (determining which VM is involved in transfer), and where the IP datagram from the first user portion is passed to the first NIC (see column 3, lines 60-66).

Macchiano does not explicitly disclose “determining that the first VM has a higher priority than the second VM” however this is taught by Vega as assigning a proportional share (priority) to a virtual machine (col. 3 ln. 39-41). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Macchiano with the priority factor taught by Vega for the purpose of allocating resources. Using priority to give preferential treatment to an application or process is well known in the art and yields predictable results (as evidenced by Vega).

Macchiano does not explicitly disclose “physical NICs” or "determining that the second NIC is not available for transferring data" or "in response to determining that the second NIC is not available, discarding the data” however this is taught by Mahalingam et al. as multiple physical NICs (Fig. 1), detecting failure of a NIC (col. 5 ln. 44-48, Fig. 2) and discarding data related to a secondary NIC (col. 15 ln. 12-18). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Macchiano with the error checking taught by Mahalingam for the purpose of transferring data. Error checking is well known in the art and yields predictable results (as evidenced by Mahalingam).

Regarding claims 49-66, Applicant states these are susbstantively comparable to the original claims, as amended. (pg. 13). Therefore, they are rejected for the same reasons.

Specifically, claims 49-50 correspond to claims 13-14. Claims 51-63 correspond to claims 1-11 and 13-14.

Regarding claims 64-66, Applicant states these are susbstantively comparable to the original claims, as amended. (pg. 13). Therefore, they are rejected for the same reasons. Claims 64-66 correspond to claims 30 and 13-14.

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Ennis et al. US 7,020,796 B1 discloses a communication system having multiple network interfaces for redundancy (abstract).

Johansson et al. US 2002/0080752 A1 discloses a network interface card selection module (paragraph 114).

Bazzinotti et al. US 7,376,743 B1 discloses a method for selecting a network interface device (abstract).

Flylnn, Jr. US 2002/0069335 A1 discloses that a system running VMs has a program to manage the "real" resources including I/O resources (paragraph 6).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JASON RECEK whose telephone number is (571)270-1975. The examiner can normally be reached on Mon - Fri 9:00am-5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Andrew Caldwell can be reached on (571) 272-3868. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Andrew Caldwell/
Supervisory Patent Examiner, Art Unit 2442

/Jason Recek/
Examiner, Art Unit 2442

(571) 270-1975